

THE LESION NEMATODE, PRATYLENCHUS COFFEAE,  
AFFECTING CITRUS IN FLORIDA

J. B. MacGowan

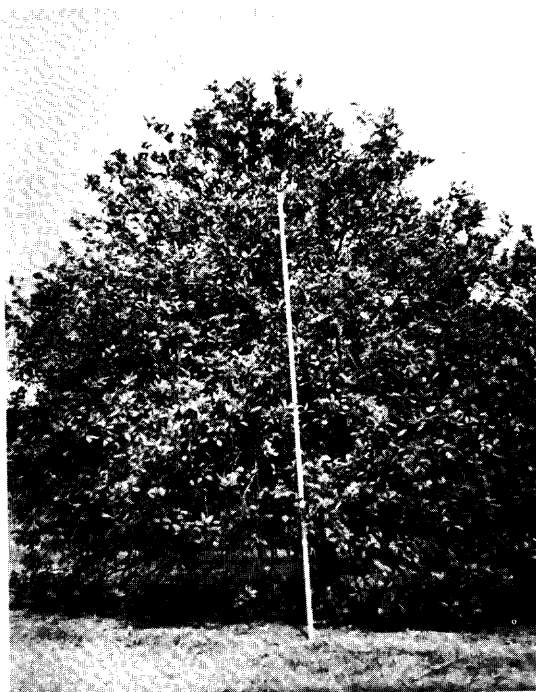


Fig. 1. Nine-year-old citrus tree showing early decline symptoms caused by Pratylenchus coffeae.



Fig. 2. Nine-year-old citrus tree showing severe stunting caused by Pratylenchus coffeae.

Pratylenchus coffeae (Zimmerman, 1898) Filipjev & Stekhoven, 1941, is a lesion nematode which is pathogenic to citrus in Florida. They are called lesion nematodes because of the characteristic brown necrotic patches or lesions which appear on the roots as a result of the feeding action of the nematodes.

BACKGROUND:

It was not until 1953 that a published report first mentioned the association of lesion nematodes with citrus in Florida. Three years later other workers noticed the broad distribution of a variety of species of lesion nematodes throughout the central and southern parts of Florida. Greenhouse experiments conducted in 1965 with 'Milam' and rough lemon rootstocks infected with mixed species of lesion nematodes showed yellowing, sparse foliage and retarded growth. During the same period an estimated 25% growth and fruit reduction was reported from several field infestations of mixed species of lesion nematodes on citrus.

In 1969 an analysis of 15 years of survey data revealed that of 3,649 citrus groves in 26 Florida counties, 93% were infested with some species of lesion nematode. Additional investigations linked lesion nematodes with poor growth which resembled spreading decline in a small number of groves. This seemed to indicate that under certain conditions lesion nematodes appeared to be pathogenic to citrus. The term "citrus slump" has been used to indicate that condition. Subsequent research revealed that Pratylenchus coffeae was the species of lesion nematode responsible for the decline condition referred to as citrus slump. The nematode was found to be associated with weak and deteriorating root systems and could reduce the root weights of infected citrus seedlings by as much as 47%.

At the time of this writing P. coffeae is only known to be present on less than a dozen citrus properties in Florida.

## SYMPTOMS AND PATHOLOGY:

The trees of a citrus grove infested with P. coffeae exhibit the following symptoms: sparse foliage, twig dieback, small fruit, general unthriftness, loss of yield, and a progressive increase in the size and extent of the visually discernible decline area.

Laboratory investigations revealed that P. coffeae invaded the root cortex but did not damage the endodermis unless nematodes entered the same site in high numbers. In most instances nematodes entered the roots singly. They also showed a tendency to enter roots in aggregates at points where the root surface was ruptured by wounds or emerging lateral roots. Lateral roots 1/2 cm long appeared to be more attractive than the main tap root. After invading the roots, nematodes were observed clustering together and forming numerous colonies which fed in the cortical tissue. Up to 150 nematodes could be observed in a single cluster. All life stages were present including eggs.

Additional observations revealed that the chief overall effect of P. coffeae when infecting rough lemon was the destruction of feeder roots. After one year, rough lemon seedlings showed a growth reduction of 22%. After 4 years under field conditions, rough lemon rootstock showed a growth reduction of 80%. Two additional rootstocks, sour orange and 'Cleopatra' mandarin, growing under the same conditions, showed growth reductions of 77% and 49%, respectively.

## REPRODUCTION AND SURVIVAL:

Pratylenchus coffeae is a vigorous reproducer. The life cycle is normally completed within 30 days. Under favorable conditions populations have increased 54 times their original numbers in 8 weeks. In the soil, reproduction will occur at temperatures between 18-32 C. The optimum temperature for reproduction is 29.5 C.

Soil moisture appears to be an important factor limiting population numbers. Investigations linked lowest population numbers with lowest soil moisture and highest temperatures. Pratylenchus coffeae is very motile and is capable of moving through the soil rapidly. Although its development is favored by fine textured soils, significant root destruction has been observed in both fine and coarse textured soils. Pratylenchus coffeae is hardy enough to survive temperatures ranging from 4.5-32.0 C in both moist and dry soils. Although tests showed that the nematodes did not survive equally as well at all temperatures, all life stages survived equally well at any given temperature.

No rootstocks have as yet been found which are resistant to P. coffeae. So far all citrus rootstocks which have been investigated (including those resistant or tolerant to the burrowing nematode) have been susceptible to P. coffeae.

## DISCUSSION:

Pratylenchus coffeae is a relatively obscure but proven pathogen to citrus in Florida. Under favorable conditions it can induce symptoms similar to or even more severe than spreading decline. At present its distribution is limited, and it does not appear to be spreading.

Regulatory personnel believe that the citrus industry is sufficiently protected by current site approval and citrus nursery certification procedures now in effect. In spite of its obvious potential, research and regulatory personnel do not consider this nematode to be a threat to the citrus industry in Florida.

## SELECTED REFERENCES:

- Feldmesser, J., W. A. Feder, and J. A. Pinckard. 1956. The occurrence of Pratylenchus spp. in Florida soil. Phytopathology 46:11 (Abstr.).
- \_\_\_\_\_, and C. I. Hannon. 1969. Susceptibility of two citrus rootstocks to Pratylenchus spp. Plant Dis. Reptr. 53:603-607.
- O'Bannon, J. H., J. D. Radewald, and A. T. Tomerlin. 1972. Population fluctuation of three parasitic nematodes in Florida citrus. J. Nematol. 4:194-199.
- \_\_\_\_\_, and R. N. Inserra. 1976. Comparative influence of Radopholus similis and Pratylenchus coffeae on citrus. J. Nematol. 8:58-63.
- \_\_\_\_\_, and A. T. Tomerlin. 1973. Citrus tree decline caused by Pratylenchus coffeae. J. Nematol. 5:311-316.
- Radewald, J. S., J. H. O'Bannon, and A. T. Tomerlin. 1971. Temperature effects on reproduction and pathogenicity of Pratylenchus coffeae and P. brachyurus and survival of P. coffeae in roots of Citrus jambhiri. J. Nematol. 3:390-394.
- \_\_\_\_\_. 1971. Anatomical studies of Citrus jambhiri roots infected by Pratylenchus coffeae. J. Nematol. 3:409-416.
- Suit, R. F., and E. P. DuCharme. 1953. The burrowing nematode and other parasitic nematodes in relation to spreading decline of citrus. Plant Dis. Reptr. 37:379-383.
- Tarjan, A. C. 1971. Migration of three pathogenic citrus nematodes through two Florida citrus soils. Proc. Soil Crop Sci. Soc. Fla. 31:253-255.
- \_\_\_\_\_, and J. H. O'Bannon. 1969. Observations on meadow nematodes (Pratylenchus spp.) and their relation to declines of citrus in Florida. Plant Dis. Reptr. 53:683-686.